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TITLE: INK JET RECORDING HEAD AND METHOD FOR MANUFACTURING THE SAME

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ABSTRACT

PROBLEM TO BE SOLVED: To solve the problem in a conventional method for manufacturing an ink jet recording head that the ejection characteristics deteriorate due to fine scum (residue of development) produced through pattern exposure of ink ejection opening (nozzle) and can not follow up higher image quality and higher definition required by a modern printer.

SOLUTION: The method for manufacturing a liquid ejection recording head comprises a step for coating a substrate 1 provided with ejection pressure generating elements 2 and a solid layer 5 occupying at least a part 4 serving as a channel, with a nozzle forming member hardened by a photo oxidation generating catalyst and forming nozzles 8 by making ejection openings 8 and removing the solid layer 5 through exposure and development, and a step for forming the ejection energy generating elements 2 wherein the solid layer 5 contains a basic substance having high nucleophilicity represented by amine or coated with that substance.

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TITLE. Inkjet recording head manufacture involves forming nozzle by removing solid-state layer with strong alkali occupying portion of flow path on substrate

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ABSTRACTED-PUB-NO: JP 2001179990 A

BASIC-ABSTRACT:

NOVELTY - The method involves forming a nozzle by removing the solid-state layer (5) occupying a portion (4) of the flow path on a substrate (1). The solid-state layer includes strong alkali. A discharge opening (8) is formed on a hardened nozzle formation material on the substrate for forming the nozzle

DESCRIPTION - The nozzle formation material is hardened using a photo-oxidation catalyst to coat the base on which an ink discharge-pressure generating component (2) is formed. An INDEPENDENT CLAIM is also included for the inkjet recording head.

USE - For manufacturing inkjet recording head used in inkjet recording system.

ADVANTAGE - Ensures simple and reliable manufacture of inkjet recording head, and stabilized ink discharge property due to prevented scum made in the ink passage

DESCRIPTION OF DRAWING(S) - The figure shows the model diagram of the substrate coated with resin layer of inkjet recording head.

Substrate (1)

Portion of flow path (4)

Solid-state layer (5)

Discharge opening (6)

CHOSEN-DRAWING: Dwg.3/7

TITLE-TERMS: RECORD HEAD MANUFACTURE FORMING NOZZLE REMOVE SOLID STATE LAYER STRONG ALKALI OCCUPY PORTION FLOW PATH SUBSTRATE

DERWENT-CLASS: P75 T04 W02

EPI-CODES: T04-G02A; W02-J02B3;

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CLAIMS

[Claim(s)]

[Claim 1] On the base with which the ink discharge pressure development element and the solid layer which occupies the portion which serves as a liquid route at least were prepared In the manufacture method of the fluid injection recording head which includes the process which covers the nozzle formation material hardened by the photo-oxide development catalyst, forms a delivery in a nozzle formation member, and forms a nozzle by removing said solid layer The manufacture method of the ink jet recording head characterized by containing a basic substance in said solid layer.

[Claim 2] On the base with which the discharge pressure development element and the solid layer which occupies the portion which serves as a liquid route at least were prepared In the manufacture method of the fluid injection recording head which includes the process which covers the nozzle formation material hardened by the photo-oxide development catalyst, forms a delivery in a nozzle formation member, and forms a nozzle by removing said solid layer The manufacture method of the ink jet recording head characterized by coating the surface of said solid layer with the basic substance.

[Claim 3] 2 is [Claim 1 characterized by said basic substances being amine, and] the manufacture method of the ink jet recording head a description either.

[Claim 4] As for said hardenability nozzle formation material to cover, 3 is [Claim 1 characterized by being the cationic-polymerization ghost of EPOKIN resin, or] the manufacture method of the ink jet recording head a description either.

[Claim 5] 4 is [Claim 1 or] the ink jet recording head characterized by being manufactured by the manufacture method of a description either.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the ink jet recording head and its manufacture method for generating the recording ink object used for an ink jet recording method

[0002]

[Description of the Prior Art] The fluid injection recording head applied to this kind of fluid injection recording method (ink jet recording method) is equipped with two or more liquid discharge energy generation parts generally prepared in a detailed recording-liquid-ejection mouth (orifice), a liquid flow channel, and a part of this liquid flow channel. And in order to obtain a high-definition picture by such a fluid injection recording head, it is desirable to breathe out the recording ink (ink) glob breathed out from said delivery at the volume always more nearly same than each delivery and discharge velocity.

[0003] In order to attain this, it sets, for example to JP,H4-10940,A or JP,H4-10942,A. Corresponding to recording information, a driving signal is impressed to an ink discharge pressure development element (electric thermal conversion element). Generate the thermal energy which gives the rapid temperature rise exceeding nucleate boiling of ink to an electric thermal conversion element, air bubbles are made to form in ink, and the method of making a liquid ink drop breathe out with the pressure of these air bubbles is indicated.

[0004] As an ink jet recording head for realizing such a method, the distance ("OH distance" is called hereafter.) of an electric thermal conversion element and an orifice needs to be able to set up with correctly and sufficient reproducibility.

[0005] As the manufacture method of this kind of ink jet recording head conventionally For example, the method indicated to JP,S57-208255,A and JP,S57-208256,A. Namely, pattern formation of the nozzle which consists of an ink pass and an orifice part on the base with which the ink discharge pressure development element was formed is carried out using a photosensitive resin material. The method of besides joining lids, such as a glass plate, and the method indicated to JP,S61-154947,A, That is, an ink pass pattern is formed by the resin which can dissolve, this pattern is covered with an epoxy resin etc., said resin is hardened, and there is the method of carrying out elution removal of the resin pattern in which said dissolution is possible, after cutting a substrate etc.

[0006] However, each of these methods is the manufacture methods of the ink jet recording head of a type (edge shooter) that the growth direction and discharge direction of air bubbles differ from each other (almost perpendicular). And in this type of head, since the distance of an ink discharge pressure development element and an orifice is set up by cutting a substrate, in control of the distance of an ink discharge pressure development element and an orifice, cutting accuracy becomes a very important factor. However, it is common to perform cutting in the mechanical means of a dicing saw etc., and it is difficult to realize high precision.

[0007] moreover, [the growth direction and discharge direction of air bubbles] as the

manufacture method of an ink jet recording head almost same type (side shooter) for example, the method indicated to JP,S58-8658,A -- that is, The dry film used as a base and an orifice plate is joined through patterned another dry film. The method of forming an orifice by photograph ring RAFI, and the method indicated to JP,S62-264975,A, That is, there is the method of joining through the dry film which had the base with which the ink discharge pressure development element was formed, and the orifice plate manufactured by electrocasting processing patterned etc.

[0008] However, even if it is difficult for each to create an orifice plate thinly (for example, 20 micrometers or less) and uniformly and is able to create by these methods The joining process with the base with which the ink discharge pressure development element was formed becomes very difficult by the brittleness of an orifice plate. Then, the "****" indication of the manufacture method explained below is done by the same applicant as the invention in this application at JP,H6-286149,A.

[0009] Namely, as shown in drawing 1 or drawing 6 later mentioned in duplication in the work example of the manufacture method of this invention ink jet recording head, the distance between an ink discharge pressure development element and an orifice can be set up with short and sufficient reappearance in very high precision. The process which forms an ink pass pattern by the resin which can dissolve on the substrate (base) with which the ink discharge pressure development element was formed in order to enable high-definition record, By dissolving the covering resin which contains a solid-like epoxy resin in ordinary temperature in a solvent, and carrying out a solvent coat on the resin layer which can dissolve this It is characterized by having the process which forms the coating resin layer used as an ink pass wall on the resin layer which can dissolve, the process which forms an ink delivery in the coating resin layer of the ink discharge pressure development element upper part, and the process eluted in the resin layer which can be dissolved.

[0010]

[Problem to be solved by the invention] However, in order to call for high-definition-izing and highly minute-ization increasingly and to miniaturize the delivery in the printer in recent years for this reason, In said many conventional parallel, since several 100nm scum exists also when it is judged in the delivery part that there is no eaves-like scum (development residue), the hindrance to which discharge characteristics fall has come out, therefore it will be necessary to lose such scum.

[0011] If an activity energy line irradiates the compatible thing of said pass section bar and a pass formation material, carrying out a scum generation will be checked -- such scum -- pass material and "" -- "***" -- in order to remain in a pass, discharge characteristics degradation is caused. Since it was the organic materials same as for a system which is going to eliminate this scum and does not cause compatibility if possible, it is difficult to make compatibility there

be nothing, therefore scum was not able to be lost.

[0012] This invention was made in view of the above aspects of affairs, and aims at offer of the manufacture method for solving the problem of the above scum generations.

[0013]

[Means for solving problem] For this reason, in this invention, it is going to attain said purpose by offering the manufacture method of the ink jet recording head shown in either of each following clause (1) - (4).

[0014] (1) on the base with which the ink discharge pressure development element and the solid layer which occupies the portion which serves as a liquid route at least were prepared In the manufacture method of the fluid injection recording head which includes the process which covers the nozzle formation material hardened by the photo-oxide development catalyst, forms a delivery in a nozzle formation member, and forms a nozzle by removing said solid layer The manufacture method of the ink jet recording head characterized by containing a basic substance in said solid layer.

[0015] (2) on the base with which the discharge pressure development element and the solid layer which occupies the portion which serves as a liquid route at least were prepared In the manufacture method of the fluid injection recording head which includes the process which covers the nozzle formation material hardened by the photo-oxide development catalyst, forms a delivery in a nozzle formation member, and forms a nozzle by removing said solid layer The manufacture method of the ink jet recording head characterized by coating the surface of said solid layer with the basic substance.

[0016] (3) The preceding clause (1) characterized by said basic substances being amine and (2) are the manufacture methods of the ink jet recording head a description either.

[0017] (4) As for said hardenability nozzle formation material to cover, (3) is [the preceding clause (1) characterized by being the cationic-polymerization ghost of EPOKIN resin, or] the manufacture method of the ink jet recording head a description either.

[0018] (5) (4) is [the preceding clause (1) or] the ink jet recording head characterized by being manufactured by the manufacture method of a description either.

[0019]

[Function] Since scum which poses a problem is not made by the above this invention methods in an ink pass, ink discharge characteristics are stabilized and a reliable ink jet recording head can be manufactured by an easy technique.

[0020]

[Mode for carrying out the invention] Below, the form of operation of this invention is explained in detail with reference to Drawings based on a work example.

[0021]

[Working example] In this example, the ink jet recording head was created according to the

means shown in drawing 1 - drawing 7 . In addition, it explains to drawing 1 - drawing 6 , including in duplication said a part of fundamental process shown in said conventional parallel JP,H6-286149,A.

[0022] That is, it is a mimetic diagram for drawing 6 to show said conventional fundamental mode from drawing 1 , and an example of the composition and fabrication sequence of the ink jet recording head of this example is shown in each of drawing 1 - drawing 6 .

[0023] In said conventional parallel, the substrate (base) 1 which consists of glass, Ceramics Sub-Division, plastics, or a metal as the typical perspective view shown at drawing 1 , for example etc is used.

[0024] Such a substrate 1 can be used without being limited to the form, especially the quality of the material, etc., if it may function as a base material of the material layer which functions as a part of liquid flow channel composition member, and forms a below-mentioned ink pass and a below-mentioned ink delivery (orifice). On the above-mentioned substrate 1, number arrangement of the request of the ink discharge energy generation elements 2, such as an electric thermal conversion element or a piezoelectric element, is carried out. By such an ink discharge energy generation element 2, the discharge energy for making the ink glob as recording ink breathe out is given to liquid ink, and record is performed.

[0025] Incidentally, when an electric thermal conversion element is used as the above-mentioned ink discharge energy generation element 2, and this element heats nearby recording ink, a change of state is made to occur in recording ink, and discharge energy is generated. Moreover, for example, when a piezoelectric element is used, discharge energy is generated by the mechanical oscillation of this element.

[0026] In addition, the electrode for control signal inputs which is not illustrated for operating these elements is connected to these elements 2. Moreover, generally, although various strata functionals, such as a protective layer, are prepared for the purpose of improvement in the durability of these discharge energy generation element 2, preparing such a natural stratum functionals does not interfere at all.

[0027] In drawing 1 , the opening 3 for ink supply is beforehand formed on the substrate 1, and the form which supplies ink from the back of a substrate 1 was illustrated. In formation of this opening 3, if it is the means which can form a hole in a substrate 1, any method can be used. For example, you may form in the mechanical means of a drill etc., and even if it uses light energies, such as a laser, it does not interfere. Moreover, even if it forms a resist pattern etc in a substrate 1 and etches into it chemically, it does not interfere.

[0028] Of course, the ink feed hopper 3 may not be formed in a substrate 1, but may be formed in a resin pattern, and may be established in the same field as the ink delivery 8 to a substrate 1.

[0029] Subsequently, as a pass pattern formation figure is shown in drawing 2 (A-A' sectional

view of drawing 1), the ink pass pattern 4 is formed by the resin which can dissolve on the substrate 1 containing the above-mentioned ink discharge energy generation element 2. Although a means to form with a photosensitive material is mentioned as most general means, formation is possible also with means, such as screen printing. When using a photosensitive material, since an ink pass pattern can dissolve, use of positive-resist or soluble change type negative resist is possible.

[0030] In using the substrate 1 which formed the ink feed hopper 3 on the substrate 1 as the method of formation of a resist layer It is desirable to dissolve this photosensitive material in a suitable solvent, to apply and dry on films, such as PET (polyethylene tele KUTARATO), to create a dry film, and to form by lamination. As an above-mentioned dry film, vinyl ketone system photodisintegration nature high molecular compounds, such as the poly methyl isopropyl ton and polyvinyl ketone, can be used conveniently. Because, before, the characteristics (film nature) as a high molecular compound are maintained before an optical exposure, and these compounds are because it is laminable easily also on the ink feed hopper 3.

[0031] Moreover, even if it arranges packing removable at a back process to the ink feed hopper 3 and forms a film in it by the usual spin coat method, the roll coat method, etc., it does not interfere.

[0032] Thus, on the resin material layer 4 which patterned the ink pass and which can be dissolved, as a coating resin layer formation figure is shown in drawing 3 , the coating resin layer 5 is further formed by the usual spin coat method, the roll coat method, etc.

[0033] Here, in the process which forms this resin layer 5, the characteristics of not changing the resin pattern which can dissolve are needed. That is, when dissolving the coating resin layer 5 in a solvent and forming this on the resin pattern 4 which can dissolve on a spin coat, a roll coat, etc., it is necessary to choose a solvent so that the resin pattern 4 which can dissolve may not be dissolved.

[0034] Next, the coating resin layer 5 is explained. As a coating resin layer 5, the thing of photosensitivity [form / with easily and sufficient precision / by photo lithography / the ink delivery 3] is desirable. Definition for such a photosensitive coating resin layer 5 to pattern the detailed pattern of an ink delivery simultaneously with adhesion with the high mechanical hardness as a structural material and a substrate 1 and ink-proof nature is required. Here, it found out having wholeheartedly the hardness, the adhesion, and ink-proof nature in which the cation polymerization curing thing of the epoxy resin was excellent as a structural material as a result of examination, and having outstanding patterning characteristics, if said epoxy resin is a solid-like in ordinary temperature.

[0035] Since the cation polymerization curing thing of an epoxy resin has high crosslinking density (high Tg) as compared with usual acid anhydride or the hardened material by amine, it

shows the characteristics which were excellent as a structural material. Moreover, by using a solid-like epoxy resin in ordinary temperature, diffusion into the epoxy resin of the polymerization start kind generated from cationic-polymerization start material by optical exposure is controlled, and the outstanding patterning precision and form can be acquired.

[0036] As for the process which forms a coating resin layer on the resin layer which can dissolve, it is desirable to dissolve solid-like covering resin in a solvent in ordinary temperature, and to form with a spin coat method.

[0037] By using the spin coat method which is thin-layer-coating technology, the coating resin layer 5 can be formed with uniformly and sufficient precision, by the conventional method, distance between the difficult ink discharge pressure development element 2 and an orifice can be shortened, and small drop discharge can be attained easily.

[0038] Here, as for the coating resin layer 5, it is desirable to be formed at a flat on the resin layer 4 which can dissolve. This is based on the following Reason. That is, if an orifice side has unevenness, when forming an ink delivery in producing unnecessary ink ** in a crevice, and the coating resin layer 5, it is that processing is easy.

[0039] Then, when the conditions which form the coating resin layer 5 in a flat were examined wholeheartedly, the concentration to the solvent of covering resin found out that it was a very serious factor in respect of the Taira slippage of the coating resin layer 5. It becomes possible by being 30 - 70wt% of concentration, and specifically dissolving covering resin by 40 - 60wt% of concentration still more preferably to a solvent, at the time of a spin coat, to make the coating resin layer 5 surface into a flat.

[0040] Here, when covering resin is dissolved by the concentration below 30wt% and a spin coat is performed, it will learn from the resin layer 4 after which the formed coating resin layer was patterned and which can be dissolved, and unevenness will be produced. Moreover, when covering resin is dissolved by the concentration exceeding 70wt%, even if the solution itself becomes hyperviscosity, and it becomes impossible [a spin coat] or it can compare and carry out a spin coat, the thickness distribution gets worse

[0041] First of all, to apply with a spin coat method, the viscosity of an ointment needs to be 10-3000 c.p.s.s This is because an ointment flows out, and an ointment dies equally and does not cross, when viscosity is too high when viscosity is too low. Therefore, it is required to choose a solvent suitably so that the viscosity of a covering resin content solution may turn into desired viscosity in above-mentioned concentration.

[0042] Moreover, when what is called the photosensitive material of an above-mentioned negative type is used as covering resin 5, the reflection from a substrate side and scum (development residue) usually occur. [however, the scum which the influence of reflective from a substrate 1 can disregard, and is further generated at the time of development in order to form a delivery pattern on the ink pass formed by the resin which can dissolve] At the

process which probes the resin which forms the below-mentioned ink pass, and which can be dissolved, since lift-off is carried out, it does not have a bad influence.

[0043] As a solid-like epoxy resin, molecular weight among the reactants of bisphenol A and EPIKUROHI drine compounds About 900 or more things, The reactant of " BUROMOSU phenol A and EPIKUROHI drine compounds, phenol novolak Or the reactant of cresol novolak and EPIKUROHI drine compounds, for example, JP,S60-161973,A. The multi-induction epoxy resin which has the oxy-cyclohexane frame of a description is mentioned to JP,S63-221121,A, JP,S64-9216,A, JP,H2-140219,A, etc.

[0044] Moreover, in an above-mentioned epoxy compound, 1000 or less compound is preferably used [a weight per epoxy equivalent] for a weight per epoxy equivalent suitably still more preferably 2000 or less. This is because crosslinking density falls in the case of a hardening reaction, Tg or heat deflection temperature of a hardened material may fall or a problem may arise to adhesion and ink-proof nature, if a weight per epoxy equivalent exceeds 2000.

[0045] As an optical cationic initiator for stiffening the above-mentioned epoxy resin Aromatic series iodonium salt and aromatic series sulfonium salt [J. POLYMER SCI.Symposium No.56 383-395 (1976) reference], and goods each SP-150 and the SP-170 grade by which Kamiichi is done in ASAHI DENKA Co. Ltd. are mentioned.

[0046] Moreover, the above-mentioned optical cationic initiator can promote cationic polymerization by using together and heating a reducing agent (crosslinking density improves as compared with independent optical cationic polymerization). However, in ordinary temperature, when using together an optical cationic initiator and a reducing agent, it is necessary to choose a reducing agent so that it may become what is called the initiator system of the redox type which does not react but reacts above a constant temperature (preferably 60 degrees C or more).

[0047] As such a reducing agent, copper truffe RATO (trifluoro methysulfonic acid copper (II)) is the optimal in consideration of a copper compound especially reactivity, and the solubility to an epoxy resin. Moreover, reducing agents, such as ascorbic acid, are also useful.

[0048] When [moreover,] higher crosslinking density (high Tg), such as an increase in the number of nozzles (high-speed printing nature) and use (waterproof improvement of a colorant) of non-neutral ink, is required Crosslinking density can be raised according to the back process which uses an above-mentioned reducing agent in the form of a solution after the development process of said coating resin layer like the after-mentioned, and dips and heats a coating resin layer.

[0049] Furthermore, it is possible to add [additive] suitably if needed to the above-mentioned constituent. For example, in order to add a flexible grant agent in order to lower the elastic modulus of an epoxy resin, or to acquire the further adhesion power with a substrate 1, adding

a silane coupling agent etc. is mentioned.

[0050] Subsequently, as the pattern exposure figure of an ink delivery is shown in drawing 4 to the photosensitive coating resin layer 5 which consists of the above-mentioned compound, pattern exposure is performed through a mask 6. The photosensitive coating resin layer 5 covers with a mask the portion which is a negative type and forms an ink delivery (the portion which makes electric connection, of course is also covered.), it does not illustrate.

[0051] Pattern exposure can be suitably chosen from ultraviolet radiation, Deep-UV light, electron rays, an X-ray, etc. according to the sensitization field of the optical cationic initiator to be used.

[0052] here, altogether, using the conventional photolithography technique, position doubling is possible for an old process, and compared with the method of creating an orifice plate separately and stretching it with a substrate, it can be boiled markedly and can improve precision. In this way, the photosensitive coating resin layer 5 by which pattern exposure was carried out may heat-treat, in order to promote a reaction if needed. Here, since the photosensitive coating resin layer 5 is constituted from ordinary temperature by the solid-like epoxy resin like the above-mentioned, the patterning precision and form where diffusion of the raw ** cationic-polymerization start kind received restrictions, and it excelled in pattern exposure are realizable.

[0053] Subsequently, the photosensitive coating resin layer 5 by which pattern exposure was carried out is developed using a suitable solvent, and as the development board of a coating resin layer is shown in drawing 5 , it forms the ink delivery 8. It is also possible to develop the resin pattern 4 which forms an ink pass simultaneously here at the time of the development of an unexposed photosensitive coating resin layer and which can be dissolved. However, since the recording head of two or more same or different forms is arranged and it is generally used as an ink jet recording head through a cutting process on a substrate 1, By developing only the photosensitive coating resin layer 5 alternatively as a measure against garbage at the time of cutting as shown in drawing 5 It is also possible to leave the resin pattern 4 which forms an ink pass (for the garbage generated at the time of cutting not to enter, since the resin pattern 4 remains in the liquid interior of a room), and to develop the resin pattern 4 after a cutting process (drawing 6 pass pattern elution figure). Moreover, in this case, since the scum (development residue) generated when developing the photosensitive coating resin layer 5 is eluted with the resin layer 4 which can dissolve, residue does not remain in a nozzle.

[0054] As mentioned above, when crosslinking density needs to be raised, postcure is performed by dipping and heating after this the photosensitive coating resin layer 5 in which the ink pass 4 and the ink delivery 8 were formed in the solution containing a reducing agent. Thereby, the crosslinking density of the photosensitive coating resin layer 5 increases further, and the adhesion and ink-proof nature to a substrate 1 become very good.

[0055] Of course, even if it carries out immediately after the process which carries out dipping heating carrying out pattern exposure, developing the photosensitive coating resin layer 5 in this copper ion content solution, and forming the ink delivery 8, it does not interfere at all, and it does not matter even if the resin pattern 4 which can dissolve after that is eluted. Moreover, they may be heated dipping dipping and a heating step, and even if they heat-treat after dipping, they do not interfere.

[0056] If it is the substance which has a reducing action as such a reducing agent, it is useful, but the compound which contains a copper ion, such as copper truffe RATO, copper acetate, and copper benzoate, especially is effective. Also in said compound, especially copper truffe RATO shows a very high effect. Furthermore, ascorbic acid is also useful in addition to said.

[0057] Thus, electrical junction (not shown) for driving the member 7 for ink supply and the ink discharge pressure development element 2 is performed to the substrate 1 in which the ink pass and ink delivery which were formed were formed, and an ink jet recording head is formed (substrate figure which has arranged the drawing 7 ink supply).

[0058] Although the ink delivery 8 was formed by photo lithography, this invention can form the ink delivery 8 also by the dry etching and the excimer laser by oxygen plasma by changing a mask, without being limited only to this. Moreover, since a substrate 1 is protected by a resin pattern and gets damaged by neither a laser nor plasma in forming the ink delivery 8 by excimer laser or dry etching, it becomes possible [also offering a recording head high / precision / and reliable]. Furthermore, when forming the ink delivery 8 by dry etching, excimer laser, etc., the coating resin layer 5 can also apply a thermosetting thing besides a photosensitive thing.

[0059] It is effective also in the color recording head which really combined two or more recording heads-like further as a recording head of the full line type which covers full [of a recording form] and can do record simultaneously

[0060] Moreover, a recording head is applied suitably also for the solid ink liquefied above a certain temperature by this invention.

[0061] The above explains this invention work example in said each process in full detail next, although the fundamental mode which can apply this invention was explained to the subject.

[0062] (Work example 1) First, in drawing 1 , the blast mask was installed on the silicon substrate 1 in which the electric thermal conversion element 2 (heater which consists of quality-of-the-material HfB2) as a discharge energy generation element was formed, and the penetrating port 3 for ink supply was formed by sand blast processing.

[0063] Subsequently, a poly methyl ISOPUROBENIRU ketone (TOKYO OHKA KOGYO [CO., LTD.] CO , LTD. make trade name ODUR-1010) 100 weight part is received as a resin layer 4 which can dissolve on this substrate 1. What applied 0.1 weight ********** on PET, dried, and used ethylenediamine as a nucleophilicity substance as the dry film was transferred to the

substrate 1 by lamination. In addition, ODUR-1010 were hypoviscosity, and since thick film formation was not able to be carried out, they were condensed and used. In this example, although ethylenediamine is depended also on 0.1 weight ********* and patterning precision, it can use effectively in the range of 0.001 - 2 weight part. When there are few amounts of addition than 0.001 weight part, an effect does not show up, and when more than 2 weight parts, poor hardening of pass formation material comes out.

[0064] Subsequently, after prebaking above each for 20 minutes at 120 degrees C, pattern exposure of the ink pass 4 was performed in Canon, Inc. make MASUKUA liner PLA520 (trade name cold mirror CM290). As for methyl isobutyl ketone / xylene =2/1, and rinse, the development of exposure used xylene for 1.5 minutes. The pattern 4 formed by resin in which this dissolution is possible is for securing the ink pass of the ink feed hopper 3 and the electric thermal conversion element 2 (drawing 2). In addition, the thickness of the resist after development was 10 micrometers.

[0065]

(Resin composition thing 1)

A name Weight part EHPE-3158 The product made from Die Cell Chemistry 100 A-187 The Nippon Unicar make 5 SP-170 Asahi Denka Kogyo K.K. make It ranked second 1.5, the above-mentioned resin composition thing 1 was dissolved in methyl isobutyl ketone / xylene mixed solvent by 50wt% of concentration, and the photosensitive coating resin layer 5 was formed in the spin coat (10 micrometers of thickness on the pass pattern 4, drawing 3).

[0066] Subsequently, pattern exposure for ink delivery 8 formation was performed in said MASUKUA liner PLA520 (CM250) (drawing 4). In addition, after-bake performed 60 degrees C of exposure for 30 minutes for 10 seconds.

[0067] Subsequently, negatives were developed by methyl isobutyl ketone and the ink delivery was formed. In addition, the phi15micrometer delivery pattern was formed in this example.

[0068] Moreover, on said conditions, the ink pass pattern 4 is not developed completely, but remains.

[0069] Usually, [on a substrate 1, since the recording head of two or more same or different form is arranged, a dicer etc. cuts in this stage and obtain each ink jet recording head, but] Here, since the ink pass pattern 4 remains as above-mentioned, it can prevent that the residue (garbage) generated at the time of cutting invades in a head. In this way, the obtained ink jet recording head was again exposed for 2 minutes in said PLA520 (CM290), and it dipped, giving a supersonic wave into methyl isobutyl ketone, and the extant ink pass pattern 4 was eluted (drawing 6).

[0070] Subsequently, 150 degrees C of ink jet recording heads are heated for 1 hour, and the photosensitive covering material layer 5 is stiffened completely.

[0071] Finally, to drawing 7 , the ink supply material 7 is pasted up on the ink feed hopper 3.

and the ink jet recording head of this invention work example is completed so that the substrate figure which has arranged ink supply material may be shown.

[0072] (Work example 2) What applied poly methyl isopropenyl ketone (TOKYO OHKA KOGYO [CO., LTD.] CO., LTD. make trade name ODUR-1010) on said PET, dried as another work example subsequently to a substrate 1 top as a resin layer 4 which can dissolve, and was used as the dry film was transferred to the substrate 1 by lamination. In addition, said ODUR-1010 were hypoviscosity, and since thick film formation was not able to be carried out, they were condensed and used. And the ethylenediamine 1% alcoholic solution was applied in the spin coat. In this example, although the spin coat of the ethylenediamine 1% alcoholic solution was carried out, when volatility carries out the spin coat of the ethylenediamine highly, it almost volatilized and remains in the ODUR-1010 surface thinly. The ink jet recording head was ***(ed) like the work example 1 henceforth.

[0073] (Comparison conventional parallel) What applied poly methyl isopropenyl ketone (ODUR-1010 by TOKYO OHKA KOGYO [CO., LTD.] CO., LTD.) on PET, dried as comparison conventional parallel subsequently to a substrate 1 top as a resin layer 4 which can dissolve, and was used as the dry film was transferred to the substrate 1 by lamination. In addition, ODUR-1010 were hypoviscosity, and since thick film formation was not able to be carried out, they were condensed and used. The ink jet recording head was ***(ed) like the work example 1 henceforth.

[0074] Thus, recording equipment is equipped with the ink jet recording head of a comparative example the created work examples 1 and 2 and conventionally. When recorded using the ink which consists of purity / diethylene glycol / isopropyl alcohol / acetic acid lithium / black dye food black 2=79.4/15/3/0.1/2.5, in this example, stable printing was possible and the obtained printing thing was highly defined. However, printing was confused in said comparison conventional parallel. When each head was decomposed and observed, in conventional parallel, several nanometers scum was observed in a part of pass.

[0075] As stated, according to this invention work example, as mentioned above, the discharge pressure development element 2, The solid layer 5 which has chiefly the portion which serves as a pass at least, and the nozzle formation member 5 hardened by the photo-oxide development catalyst on the prepared base 1 are covered. In the manufacture method of the fluid injection recording head which includes the process which forms a delivery 8 by exposure development and forms a nozzle by removing a solid layer 5, and a discharge energy generation element formation process Said technical problem is solvable by the ink jet recording head characterized by containing in this solid layer 5 the basic substance (nucleophilic, strong substance) represented by amine, or coating, and its manufacture method.

[0076] Moreover, a photo-oxide development curing catalyst generates the cation which

irradiates light, and this carries out ring opening polymerization of the EPOSHIKI ring of an epoxy resin. However, if a nucleophilicity substance (basic substance) exists, the generated cationic initiator and a strong ion pear will be formed, and it will form a stable covalent bond, and it not only checks protonation of an epoxy monomer, but will cause a cessation reaction.

[0077] For this reason, since the pass formation material of the portion which is in contact with the pass section bar is not hardened, scum is not generated.

[0078] In this example, although ethylenediamine was used as a nucleophilic substance, almost all the amine and alkali substance can be used as amine.

[0079] For example, as amine, it is A-1110 (Nippon Unicar γ-aminopropyl trimethoxysilane), The meta xylene diamine p, p'-diamino diphenylmethane ethylene glycol (3-amino pro building) ether, etc. can be mentioned.

[0080]

[Effect of the Invention] Since [which is impossible for an ink pass as operative] it was brought by the manufacture method of this invention as explained above, ink discharge characteristics were stabilized and the reliable ink jet recording head became possible [manufacturing by an easy technique].

[Translation done]